

# Public Health Disaster Aid

*in the*

## Rio Grande Flood of 1954

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AS HURRICANE ALICE, the first hurricane of 1954, whirled out of the Gulf of Mexico and across a sparsely inhabited section of Mexico below Brownsville, Tex., inflicting only minor damage to the Brownsville-Matamoros area, the residents of Texas and northern Mexico relaxed and began enjoying the long-needed rains that came to the lower Rio Grande Valley. But Hurricane Alice was not to be dismissed so lightly. As the main body of the storm moved northwestward across Mexico and into the Pecos Valley of Texas, it pushed huge masses of moist air some 650 miles inland from the mouth of the Rio Grande. Great torrents of water were released on the watershed of the Rio Grande in both Texas and Mexico as this storm blew itself out in the Pecos Valley.

On Sunday, June 27, torrential rains fell on

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Crockett County, and a 36-foot wall of water rushed down Johnson Draw to Devils River and on to the Rio Grande to join waters from northern Mexico and the Pecos Valley. As much as 34 inches of rainfall was observed during the storm period at points 22 to 40 miles northward from Langtry, Tex. The Pecos River crested at the Southern Pacific Railroad high bridge 16 miles east of Langtry at 96.24 feet, and one of the greatest natural disasters in the history of the southwest was on the move.

### Extent of Flood Damage

At 5 a.m. on June 28 the floodwaters in Johnson Draw crested in Ozona, isolating the town and driving approximately one-third of the population from their homes. Many homes were destroyed by the rushing water, and the number of deaths was eventually established at 22. Many head of livestock were lost, and many of the carcasses were left in or near the town by the receding floodwaters. Three fires in the city burned out of control because fire hydrants were submerged by floodwaters.

At Del Rio the Rio Grande began to rise on June 27 and reached its crest of 38.25 feet at 9:30 a.m. the next day. Comparatively little damage was suffered on the American side of the river, since Del Rio is some distance away. Very little rain fell in this area, so the San Felipe Creek, from which the city obtains its water supply, did not rise, and the water plant remained in continuous operation. Only a few

families residing in bottom lands adjacent to the river had to be evacuated.

Acuña, in Mexico, across the Rio Grande from Del Rio, was devastated. Most of the residents heeded advance warnings and fled to the hills nearby, but they suffered severe property losses. The approach to the international bridge was inundated and washed out. The Quemado Valley, above Eagle Pass, was flooded, and the irrigation system was so severely damaged that water from the river could no longer be diverted into the canal system. Many residents of the valley use the canal water for domestic purposes.

The flood crest moved on down the river, reaching 53.51 feet at Eagle Pass at 4 a.m. on Tuesday, June 29. At this point it exceeded the previous high of 49 feet, which had occurred on September 2, 1932.

Operation of the water treatment plant at Eagle Pass was discontinued at 3:30 a.m. Two emergency gasoline-driven sump pumps had been installed previously to protect the main electrical control panel, the wash water pumps, and the motors of the vertical high-lift pumps, which were all located in the basement. The shower, toilet, and other plumbing fixture drains had been plugged and the doors calked and sandbagged to prevent entrance of water. In spite of these precautions, leaks in the basement wall increased until the safety of personnel was threatened, and the plant was closed.

The entire business section of Eagle Pass was flooded to a depth of 8 to 10 feet, and the city's sewage treatment facilities were completely inundated. Although there was extensive settling of backfill along the sewer lines, no major breaks or serious clogging occurred, and sewage flowed freely to the treatment plant and to the flooded river. Two of the four oxidation ponds were washed out, and the treatment plant suffered some damage but continued to operate. Property losses of merchants were severe, and many homes in low areas along the creeks were flooded.

Floodwaters first seeped through the levee on the Mexican side of the Rio Grande at Piedras Negras into an old riverbed, trapping residents who had not heeded warnings to leave their homes. As the flood approached its crest, it overflowed the levee, and the trapped people

were forced to the roofs. There they huddled by lantern light to wait out the flood. During the night observers on the American side watched helplessly as the adobe homes melted and sank, and the floodwaters extinguished the lights one by one. Because many of these people were itinerant workers seeking entrance into the United States, the casualty list could never be definitely established.

On Wednesday, June 30, at 9:30 a. m. the Rio Grande reached a record crest of 61.35 feet at Laredo, 10 feet above the previous high mark on September 3, 1932. The International Boundary and Water Commission engineers anticipated a crest of 26 feet above the floor of the international bridge; it was 8 inches higher. Reports of the disasters at Acuña and Piedras Negras forced acceptance of the warnings at Laredo and Nuevo Laredo. The low areas along creeks in Laredo and the extensive low areas of Nuevo Laredo were evacuated. Consequently, no lives were lost in either city even though a large section of Nuevo Laredo was completely demolished by the rushing floodwaters.

Early in the evening of June 29 the raw water pumps at the Laredo water treatment plants became flooded and failed. The old plant, which had a capacity of 9 million gallons per day, was flooded and put completely out of commission.

The Laredo sewage treatment plant was completely submerged and had to be bypassed for a considerable time; but since the low areas along the creeks, which were mostly unsewered, comprised the major portion of the flooded area, there was no serious damage to the collection system.

Along the 250 or more miles of ravaged river course, many municipal water facilities were destroyed or inundated, and wells or other sources of supply were filled with filth-laden surface water. Sewage treatment plants and garbage disposal facilities were destroyed or severely damaged. Litter and silt covered the land, and putrescible material deposited with it was malodorous and provided limitless resources for the propagation of flies and other vermin. Mosquitoes multiplied rapidly because of the thousands of acres of residual water, and

they found easy access to the dispossessed human population.

### **Mobilization of Resources**

On June 27, the day the flood crest first threatened residents of the border, the Texas Defense and Disaster Control Center at Austin was activated. This group, which was to become the operations nerve center of the disaster activities, was made up of representatives of the Texas State Departments of Health, Public Safety, Public Welfare, and Highways, Aeronautics Commission, Insurance Commission, Attorney General's office, and Railroad Commission; the State relations officer of the American Red Cross; a regional Public Health Service engineer; and the assistant regional director of the Federal Civil Defense Administration. The center immediately commenced mobilization of all resources for aid to the stricken and endangered areas.

The Communicable Disease Center of the Public Health Service was alerted Monday morning, June 28. Then or subsequently, arrangements were made for the assignment of two vector control specialists, 20 semiskilled laborers, 4 power-spray units, 20 hand-spray cans, 2 portable water treatment plants, 7 trucks, and a supply of insecticides and water treatment chemicals.

As the flood crest started downstream, there was no way of knowing the extent to which it might be supplemented by waters from northern Mexico; therefore, State and Federal personnel were alerted and material was readied for aid to the lower Rio Grande Valley should the Falcon Dam prove inadequate. The International Boundary and Water Commission opened the gates of the dam to maintain the river flow at half bank. When floodwaters began reaching the lake, the river below was allowed to flow bankful. Two and one-half million acre-feet of floodwaters was eventually held behind the dam with no damage to the lower valley.

On July 1 the flood was declared a major disaster under Public Law 875 (81st Cong.). Hence, responsibility for coordinating Federal assistance was assumed by the Federal Civil Defense Administration under authority of Executive Order 10427.

Ultimately, the governmental, voluntary, commercial, and individual forces of two nations equipped to deal with such disasters were gathered in this area to protect the health and welfare of the affected inhabitants.

### **Emergency Public Health Measures**

Throughout the period from June 27 to July 8, the Texas Defense and Disaster Control Center maintained a constant check on the developing disaster and the needs created, using the mobile radio communications of the Texas State Department of Public Safety. Through joint action of the various participants the center located, procured, and dispatched to various points in the area technical personnel and essential supplies and equipment as they were needed.

#### *Ozona*

On June 30, when the flood crest was just reaching the Laredos, vector control operations were initiated in Ozona. At the request of the Ozona health officer, relayed to the Austin control center by an amateur radio operator, insecticides, power- and hand-spraying equipment, and vector control specialists from the State and the Public Health Service were sent to the town.

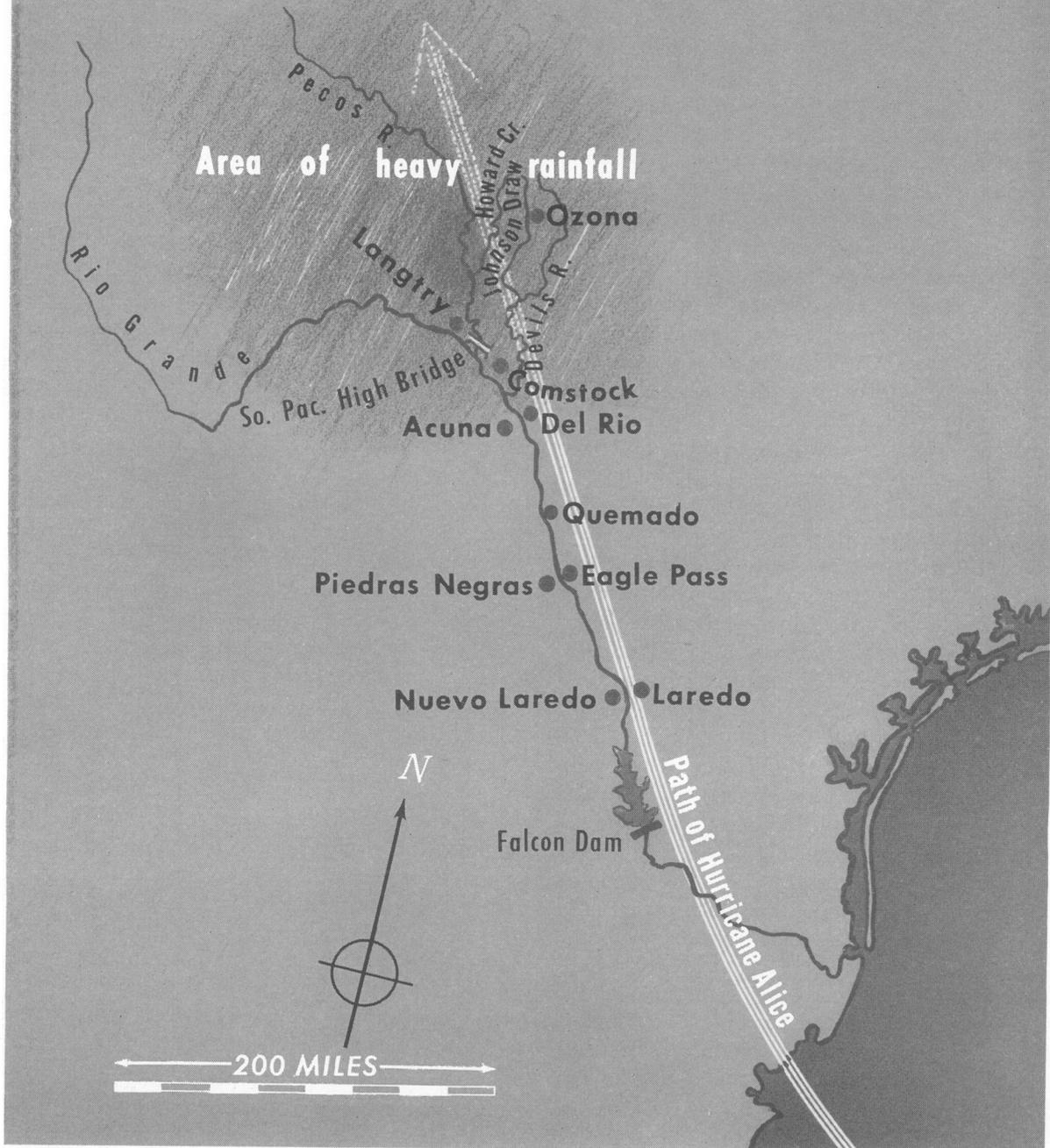
By Thursday, July 1, flies and mosquitoes were under control; an oil-DDT larvicide had been applied to all standing water; privy pits had been thoroughly treated with 3 percent gamma benzene hexachloride (BHC) dust; and the city had been space sprayed twice with a DDT emulsion using truck-mounted equipment. At the direction of CDC and State health personnel, many animal carcasses were removed to rendering plants. Those originally overlooked in the bushy areas of Johnson Draw were buried with bulldozers. Meanwhile, immunization clinics had been established, damaged food removed, and water and milk supplies checked for safety. All operations were turned over to local personnel on July 2, and State and Federal men and equipment were moved on down to the Rio Grande to bolster the crews already working downstream.

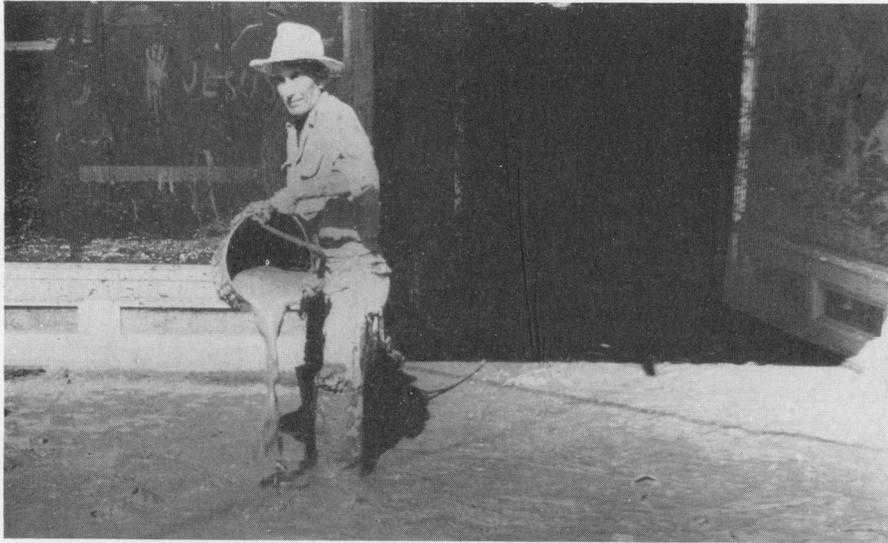
#### *Comstock*

Early in the flood crisis, normally quiet or dry streams throughout the area became raging

# Rio Grande Valley

Area affected by flood of 1954





**Eagle Pass**

**Nuevo Laredo**



**Laredo**



**Nuevo  
Laredo**

torrents, ripping out highway and railroad bridges and communications lines. Word was received at the State center that many motorists and 266 persons aboard a Southern Pacific train were stranded north of Comstock, Tex. The State relations officer of the American Red Cross arranged for the Red Cross to reimburse the military for the cost of evacuating stranded persons by helicopter to Comstock. All local Red Cross chapters in the flood area were alerted, and arrangements were made for medical personnel to be on hand to meet the rescued persons.

#### *Del Rio and Acuña*

Destruction of the approaches to the international bridge connecting Del Rio and Acuña cut off ground transportation between the two cities; contact was reestablished by helicopters obtained through arrangements with the military and the Red Cross. Until other help arrived, the people of Del Rio sent generous quantities of food, milk, and water to the stricken Mexican city. The Red Cross then furnished food, shelter, and field kitchens for the preparation of food. Insecticides were provided through public subscription by the citizens of Del Rio for treatment of the entire area.

By midnight of June 29, typhoid vaccine and drugs, water purification tablets, insecticides, insecticide-dispersing equipment and personnel, flushing equipment, and mobile water purification units were on the way to the remaining stricken and endangered areas along the river. By noon of July 1, immunization clinics and vector control operations were in full operation in those areas already passed by the flood crest.

#### *Eagle Pass and Piedras Negras*

Floodwaters at Eagle Pass, which had crested at 4 a.m. on June 29, subsided so quickly that it was possible to return to the water treatment plant 2½ hours later. There was no major damage to the plant building, and only the wash-water pump motors had been flooded. The raw water submersible pumps were not damaged. The equipment was checked, the filters and final sedimentation basin were disinfected with high-test calcium hypochlorite, and the plant was back in operation by noon. No major breaks in the water mains occurred, and

within the hour all sections of the city had adequate water pressure with free chlorine residuals in excess of 1 p.p.m. throughout the system.

State and CDC vector control personnel began operations in Eagle Pass on July 1 with three pieces of CDC automotive equipment, a power mist sprayer, hand-spraying equipment, and insecticides. Crews began the treatment of 900 privies in the city with 3 percent gamma BHC dust, and residual spraying of privy buildings and animal pens and larviciding of all residual water were started. Space spraying for the control of increasing mosquito populations was also commenced. Much organic material in the flooded area required immediate and regular treatment until it could be disposed of in a sanitary landfill.

At this time, mosquitoes were becoming a serious hazard in the Quemado Valley. Large areas here and in the Rio Grande riverbed adjacent to Eagle Pass were beyond the reach of either ground power equipment or hand-spray crews. Following authorization by the Maverick County judge, these areas were dusted by airplane with 10,000 pounds of 3 percent gamma BHC. With a CDC power sprayer, space sprays and larvicides were applied to mosquito-breeding areas in populated portions of the valley.

Also on July 1, helicopter service between Eagle Pass and Piedras Negras was established to carry food and medical supplies to the Mexican city. All available fire hoses from Eagle Pass and many adjacent communities and from Saltillo, 80 miles south of the Rio Grande, were gathered, joined together, laid across the remains of the international bridge and tapped into the Eagle Pass water system. Safe water was thus supplied to Piedras Negras until its water plant could be restored to operation.

Insects in Piedras Negras found favorable conditions for breeding. In one flour mill, for example, huge stacks of milled flour and 500 tons of wheat were soaked under 10 feet of water. The enormous increase in the fly population made control by insecticides impossible. Removal and burial of such material, a task of major proportions, thus became imperative. Even after this material was removed, many potential breeding places for mosquitoes and flies remained. In the first few days after the

flood, Piedras Negras and the adjacent area were dusted by airplane with 10,000 pounds of BHC. Materials and air service were contributed by the people of Eagle Pass and Maverick County.

On June 29 a request was made to the State control center for an improvised hospital for Piedras Negras. Through joint action within the center by representatives of the various agencies, all essential items were located, procured, and cleared for air transport within 3½ hours.

#### *Laredo and Nuevo Laredo*

As the flood progressed, it became apparent that Laredo would be the most severely affected of the communities in the United States. The Texas State Department of Health requested that an engineer from the Public Health Service regional office be sent to Laredo to assist in emergency sanitation and rehabilitation activities. As more complete information on the flood reached the Texas control center, the extent of vector problems at Laredo became predictable.

By the afternoon of July 2 the situation in the flood areas had become fairly stable; that is, existing problems were rather well known, and the amount of assistance that would be required throughout the river's course could be estimated. At this time, a board was established at Laredo for hearings under Public Law 875 to make available Federal financial aid for emergency repairs to public facilities damaged by the flood.

Reestablishment of an adequate supply of safe water was a pressing need in Laredo. High water prevented reactivation of the two treatment plants until July 1. In the meantime, since it was known that the raw water intakes were damaged, an emergency gasoline-engine-driven, skid-mounted pump with a capacity of 5 million gallons per day was obtained.

The old treatment plant in Laredo was severely damaged. Water had reached the second floor, and great quantities of silt, debris, and logs had entered the various buildings. Electrical wiring was ruined, chemical-feed machines were badly damaged, and the high-lift pump and motors and the electrical control panel were flooded. The area around the raw

water source had been washed away, and the 30-inch pipe header was broken.

The Laredo Waterworks System immediately contracted with a construction company to restore temporary service. Approximately 1 million gallons of water in the settling basins at the old plant were pumped to the main with the emergency pump. Drinking water was rationed to the public from a 1½-million-gallon supply of treated water which, through foresight on the part of the plant operators, had been stored in elevated tanks before the plant was inundated. Access roads to the plants and to the river had been washed out, but a supply of water was available from a lake at the edge of the city. Ten 1,000-gallon water tank trucks, supplied along with gravel trucks and bulldozers by the State highway department, transported water, after it was treated, to distribution points throughout the city. A sufficient supply of safe water was thus assured.

The road to the water treatment plants was repaired, and thousands of yards of gravel and dirt were used to build a road to the river. It finally became evident that the heavy deposit of silt would not provide a secure footing for the pump and that a floating mount would have to be obtained. For use as a temporary mount, a section of pontoons was provided by the United States Army Engineers, who were constructing a pontoon bridge for a temporary crossing in place of the washed-out international bridge. A temporary steel line was installed and connected to the undamaged section of the 30-inch line, and raw water was again available to the new treatment plant on July 4.

Throughout the emergency all water delivered to the distribution system had a chlorine residual of at least 10 p.p.m., and adequate residual was found to be available over the entire distribution system. By July 12 the motors of the low-lift stations and the pipe connections to the 30-inch line had been repaired, and an adequate raw water supply was available to the new plant. The rate of filtration was increased and about 7 million gallons per day was supplied to the city, which has a normal daily demand of 12 to 14 million gallons. Repairs to the old plant proceeded slowly as originally unforeseen difficulties were encountered.

A vector control specialist of the Communicable Disease Center was designated as the principal Public Health Service representative in the flood area for advising on insect control. The Laredo phase of insect control activities was begun on July 1, with the arrival of a power sprayer-duster and an emergency supply of chemicals from the Tyler, Tex., warehouse.

By July 3, hand-spray crews, using transportation provided by the city, were larviciding residual water and treating all organic material in the flooded areas. Dead fowl and animals were treated thoroughly, and the city garbage department was notified of their location. All carcasses were removed within a few hours after they were found.

Because of the initial interruption of service and the increased load, the city garbage department was unable to maintain a regular collection schedule, and flies multiplied rapidly. A jeep-mounted sprayer belonging to the Public Health Service was brought in from Eagle Pass on July 4 to supplement the State's mist sprayer. A round-the-clock schedule was set up for treating the city and a large mosquito-breeding area to the north with 5 percent DDT emulsion and 10 percent DDT dust. The mosquitoes were quickly conquered, and the fly population was reduced to a point well below normal in all sections of the city. The flooded areas of the city and the debris-laden riverbed were dusted with 3 percent BHC by an airplane provided by the United States Corps of Engineers. As insecticides became available, crews began dusting all of the city's 4,500 privy pits with 3 percent BHC and residual spraying all flooded buildings.

Since a large section of Nuevo Laredo had been completely demolished by the flood, the need for housing, food, and clothing was urgent. The Mexican Government immediately began construction of temporary housing for the displaced families, and food and clothing were provided by the American Red Cross. The insect problem, always a major one in this city, was intensified. Power-spraying equipment was offered the city, but a lack of trained personnel made its use impracticable. Hand equipment, insecticides, and technical supervision were supplied and put to use.

### **Postemergency Measures**

As the board established on July 2 in Laredo to hear requests for Federal aid began to function, requests to the State control center in Austin dwindled, and on July 8 the center was closed. The Laredo board directed the planning of programs that were to continue long after the flood had passed. It approved Federal Civil Defense Administration projects in Crockett, Val Verde, Maverick, and Webb Counties, and in Eagle Pass and Laredo, costing approximately \$663,031, for emergency cleanup, insect and vector control, repairs to water and sewage facilities, repairs to streets, roads, and bridges, and emergency medical and other supplies.

Most operations after July 8 were extensions of the emergency activities and construction work in the repair or replacement of public and private facilities. On July 10 a temporary bridge was opened between Eagle Pass and Piedras Negras. On July 12 raw water was restored to the new treatment plant in Laredo. Until August 25, however, the two water purification units provided by CDC continued to furnish emergency drinking water supplies in the Quemado Valley.

On July 19, CDC hired 7 inspector-foremen and 9 laborers to extend the vector control work at Laredo, and a long-term sanitary improvement project was begun in that city.

Throughout the critical period, immunization clinics operated quietly and efficiently. Sixty-eight thousand of the 100,000 residents of the disaster area of Mexico and 62,000 of the 80,000 Texans were immunized against typhoid fever. Vaccine for both Americans and Mexicans was furnished by the Texas State Department of Health and the Fourth Army Headquarters.

No outbreaks of dysentery or diarrhea were observed. In fact, the incidence of these diseases appeared to be below normal, probably as a result of better diets, sanitary food storage and preparation by the Red Cross, safe drinking water, and the control of insects. Not one case of communicable disease which could be charged directly to the flood was reported on either side of the border.

During this disaster, many individuals and

organizations contributed equipment, money, and services to add to the total relief activity. Usually such action is unrecorded. However, one instance of such assistance can be reported here. During the July 4 weekend, the need for insecticides in the Laredo area had become critical. Material had been delivered as far as San Antonio, but it was delayed there awaiting Government transportation to the disaster area. A San Antonio, Tex., truckline operator donated the services of a truck and driver to rush 8,500 pounds of the badly needed chemicals to Laredo.

By September 3 nearly all emergency work was finished and another disaster had become history.

### **Lessons From the Experience**

A natural disaster such as the Rio Grande flood of 1954 demands immediate and force-

ful action to save lives, protect property, and minimize suffering. From a critical review of the problems encountered and the action taken, one lesson stands out clearly: The prompt activation of a disaster control center in which representatives of all local, State, and Federal agencies concerned serve cooperatively under a central authority to observe the developments and trends of the catastrophe, evaluate the problems, plan the emergency action, and initiate relief measures is of inestimable value. An operational headquarters at the site of the disaster as an extension of the disaster control center would insure maximum efficiency by minimizing duplications of actions and misunderstandings.

Development of the framework for a disaster control center in each State and Territory would be an excellent step forward. Collectively, such centers would constitute a valuable national resource in disaster aid.

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## **technique**

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### ***Community Nursing Service***

An experiment in community nursing conducted for more than 2 years in school district 4, Spartanburg County, S. C., combines school nursing with nursing care of the sick and other aspects of public health nursing.

The program was initiated in response to a recommendation made in 1951 by Dr. Carl Buck that the nursing services of the county health department and the Visiting Nurse Association be integrated. Carried out by two nurses, Miss Marjorie Cannon and Mrs. DeVieux Campbell, under the supervision of the county supervisor of nurses, Miss Evelyn Johnson, the combined service was directed by Dr. J. C. Hedden, the county health officer.

According to Sam C. Brissie, district 4 school superintendent, setting

up the program in trial demonstration form has allowed improvisation and close adaptation to the needs of the community, a textile region with both urban and rural components in a population of about 12,500.

Scheduled visits to the 8 elementary and 3 high schools provide teachers with the opportunity to consult the nurses on problems arising with the students or in homes represented in their classes. Repeated visits by the same nurses to the same families, whether to see the school child or another family member, enable the schools to maintain continual contact with homes where health problems interfere with the children's education. Through personal contact, the nurses have been able to recognize other home problems and refer them to the proper agencies. As representatives of the school or of the nursing service, they work with such welfare organiza-

tions as the Woodruff Exchange Club, from which they obtained eyeglasses for needy children. They have also worked closely with the tuberculosis association in planning and carrying out an X-ray survey.

In the school instruction program, the nurses show films and teach home and disaster nursing to home economics classes. All schools have been provided with standardized first aid supplies and charts showing how and when each item is to be used.

Brissie feels that the combined nursing service represents a greater contribution to this community than the work of many school nurses who remain all day in one building waiting for an accident to happen. Of all the types of nursing programs possible for the district, it comes the closest to fulfilling the total needs of the community for nursing services, he stated.